

We Claim:

1. A real time distribution system for a multi-element network comprising:
a master network element having timing means to derive a real time stamp;
distribution means to distribute the real time stamp to the remaining network
elements;
means in the network elements to maintain a record of the most recently
distributed real time stamp; and
means in the network elements to derive a local time stamp from the recorded
time stamp in the event of a failure of the distributed time stamp.
2. A real time stamp distribution system as defined in claim 1 wherein the local time
stamp is disregarded upon receipt of a real time stamp distributed by the master
network element.
3. A real time stamp distribution system as defined in claim 1 wherein the network
elements derive an estimate of the next real time stamp to be delivered by the
master network element.
4. A real time stamp distribution system as defined in claim 3 wherein an error
detector compares the estimated next real time stamp with the distributed real
time stamp and provides an error indication if the two values are not in
agreement.
5. A real time stamp distribution system as defined in claim 4 wherein the network
elements correct the real time stamp by deriving a time stamp from the local time
stamp upon receipt of an error indication.
6. A real time stamp distribution system as defined in claim 5 wherein a record is
kept of the number of occasions that the real time stamp is derived by the network
elements from the local time stamp.

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7. A real time stamp distribution system as defined in claim 6 wherein the network element has means to switch over to local time stamp derivation if the number of occasions that an error is detected exceeds a preset number.
8. A real time stamp distribution system as defined in claim 7 wherein a network element switches over to the local time stamp when a certain number of consecutive errors have been detected.
9. A real time distribution system for a multi-element network comprising:
a master network element having timing means to derive a real time stamp;
distribution means to distribute the real time stamp to the remaining network elements; and
means in the network elements to maintain a record of its real time stamp; and
synchronization means to indicate when the recorded real time stamp is synchronized with the real time stamp distributed by the master network element.
10. A real time stamp distribution system as defined in claim 9 wherein the timing means derives a real time stamp from an outside source.
11. A real time stamp distribution system as defined in claim 9 wherein the synchronization means implements a synchronization feature in the network element upon a re-start operation.
12. A system as defined in claim 1 wherein at least one network element has a underrun error detector to compare the record of the high precision portion of the RTS with the low precision portion distributed by the master element and to provide an underrun error signal if the low precision portion is updated before the recorded value indicates such an update is correct.
13. A system as defined in claim 1 wherein at least one network element has a overrun error detector to compare the record of the high precision portion of the

RTS with the low precision portion distributed by the master element and to provide an overrun error signal if the low precision portion is not updated before the recorded value indicates such an update is correct.

14. A system as defined in claim 12 having error correction means to correct for underrun errors.
15. A system as defined in claim 13 having error correction means to correct for overrun errors.
16. A system as defined in claim 1 wherein said real time stamp has a high precision portion, a low precision portion, and an intermediate portion, the intermediate portion being encoded with a deterministic pattern which is known by the network elements.
17. A system as defined in claim 16 wherein each network element has means to predict the next intermediate portion of the RTS whereby an error detection and correction scheme is implemented.
18. A system as defined in claim 17 wherein said error correction scheme corrects data errors.
19. A system as defined in claim 16 wherein software in said network elements detects a software message error when a last value of the deterministic pattern of the intermediate portion of the RTS is received before a low precision portion update has been received.
20. A system as defined in claim 19 wherein the software in the network elements can correct the software message error.

21. A method of distributing a real time stamp for a multi-element network comprising:
providing a master network element having timing means to derive a real time stamp;
providing distribution means to distribute the real time stamp to the remaining network elements;
providing means in the network elements to maintain a record of the most recently distributed real time stamp; and
providing means in the network elements to derive a local time stamp from the recorded time stamp in the event of a failure of the distributed time stamp.

22. A method of distributing a real time stamp for a multi-element network comprising:
providing a master network element having timing means to derive a real time stamp;
providing distribution means to distribute the real time stamp to the remaining network elements;
providing means in the network elements to maintain a record of its real time stamp; and
providing synchronization means to indicate when the recorded real time stamp is synchronized with the real time stamp distributed by the master network element.